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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/641,720

08/15/2003

Toshihiro Suzuki

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05/05/2006

GREER, BURNS & CRAIN

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25TH FLOOR

CHICAGO, IL 60606

EXAMINER

CARIASO, ALAN B

ART UNIT

PAPER NUMBER

2875

DATE MAILED: 05/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

14A

Office Action Summary	Application No.	Applicant(s)	
	10/641,720	SUZUKI ET AL.	
	Examiner	Art Unit	
	Alan Cariaso	2875	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6 and 8-14 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6 and 8-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some * c) ☐ None of:
 - 1. ☒ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
 Paper No(s)/Mail Date 200.
- 4) ☐ Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Receipt of amendment-after-final filed March 27, 2006 is acknowledged and entered. Claims 1-6 and 8-14 are pending, of which claim 1 is amended. Claims 7 and 15-50 are canceled.
2. In view of newly cited prior art and new grounds for rejection of claims set forth in this Office Action, the finality of the former action is withdrawn.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 8, 9 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by IKEDA et al (JP 7-95360).
5. IKEDA discloses a lighting unit (fig.18) comprising a light guide plate (4'), a light source (8), and a truncated pyramid (4b') arranged between the light guide plate (4') and the light source (8), said truncated pyramid (4b') having a base (in phantom or dots against 4a in fig.2 or as shown by fig.19A), a top (41' in fig.19A) smaller than the base, wherein the top (41') is an outermost peripheral surface (fig.19A), and a slope (4b') extending between the base and the top, the light source (8) being arranged in close contact with the top (41') of the truncated pyramid, the light guide plate (4a') being

Art Unit: 2875

arranged in close contact with the base (fig.19A) of the truncated pyramid (4b'), so that light is propagated from a light emitting part (82, fig.20) of the light source (8) to the light guide plate without passing through any air layer (fig.18); wherein the truncated pyramid (4b') and the light guide plate (4a') are integrated with each other (fig.18), and the light source (8) is attached to the truncated pyramid (4b'); wherein the light source (8) and the truncated pyramid (4b') are integrated with each other (figs.18 or 21), and the truncated pyramid (4b') is attached to the light guide plate (4a'); wherein the light emitting part or surface (either light source section 8-fig.21 or 82-fig.20) is smaller than or equal to the top (41') of the truncated pyramid (4b'); wherein the light source (8) comprises at least one LED (English abstract).

6. Claims 13 and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by ITO et al (US 2001/0017774 A1).

7. ITO discloses a lighting unit (figs.18-21) comprising a light guide plate (78), a light source (11b,11c), a truncated pyramid (16b or 13c) arranged between the light guide plate (78) and light source (11b,11c) and formed as a wedge-shaped member (fig.18), a base (adjacent 72a, fig.18) of the truncated pyramid (13c) being joined to or placed in close contact with the light guide plate (78), the light source (11b,11c) being located near the truncated pyramid (16b,16c), and wherein a reflecting member (12b,14b,12c,14c) is placed to surround the light source (11b,11c) and the truncated pyramid (16b,13c), and a light absorbing member (shielding layer 41, paragraph 0160) is located near a border (72a) between the wedge-shaped member (16b,13c) and the

Art Unit: 2875

light guide plate (78) and wherein the light absorbing member (41) at least partially surrounds a portion (fig.18) of the truncated pyramid (13b,fig.19); a display device including the light unit (figs.5-6A) and a display element (paragraph 0001).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 4, 6 and 14 (dependent on claims 1-4, 6, 8, 9 and 12) are rejected under 35 U.S.C. 103(a) as being unpatentable over IKEDA et al (JP 7-95360) in view of UNGER et al (US 6,164,789).

10. IKEDA discloses the claimed invention including the truncated pyramid (4,6,12,43) having an inherent refractive index and is shown to have a slope angle. However, IKEDA does not disclose: the angle (α) of the slope of the truncated pyramid being equal to or greater than arcsine (1/n) (claim 4); the truncated pyramid (43) comprising an adhesive member (claim 6); and a display element (claim 14).

11. UNGER teaches a tapered coupling waveguide (210, fig.8) loses light when light reaches the tapered walls at less than the critical angle $\theta_c = \sin^{-1}(n_1/n_2)$ (Snell's law, col.4, lines 47-65) where n_1 is refraction index of air (essentially $n_1=1$ for air) and n_2 is the refraction index of the waveguide (210) for the purpose of producing a taper angle

Art Unit: 2875

that would minimize light loss in guiding light to a second light guide panel or plate (220). It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the truncated pyramid of IKEDA et al to include a taper angle that is greater than or equal to the critical angle $\theta_c = \sin^{-1}(n_1/n_2)$ in order to maximize light propagation there within to reach the attached light guide plate.

12. UNGER further teaches an optically transparent adhesion layer (240, fig.8, col.3, lines 62-67) fusing the tapered coupling waveguide (210) to the light guide plate (220), the adhesion layer having an index of refraction substantially equal to that of waveguides (210,220) for the purpose of maximizing light transfer therebetween. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the separate attached pieces of the light transition pyramid and light emitting panel of PARKER (col.3, lines 4-6) to include the type of adhesion layer between them as taught by UNGER in order to maximize light transfer.

13. UNGER further teaches employing such tapered and plural waveguides as a back-lit illumination system (col.1 lines 4-25) including application towards displays (col.6, lines 13-18). It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the lighting unit of IKEDA et al applied for backlighting applications as taught by UNGER in order to provide efficient illumination of the display from effective light source and reflective optics with sufficient depth savings (col.1).

14. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over IKEDA et al (JP 7-95360) in view of INDITSKY (US 7,001,058).

15. Claim 10 recites a reflecting member placed to at least partially surround the light source and the truncated pyramid not disclosed by IKEDA.

16. INDITSKY teaches a reflector (64 in fig.6G; 85 in fig.12A, col.12, lines 31-32) placed to surround at least the light source (60-fig.6G, 88-fig.12A) and the truncated member (focon or coupling section 87, col.24, lines 3-14) for the purpose of reflecting any diverging rays from the light source, coupling section and LGP (light guide plate). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the light unit of IKEDA et al to include the type of reflector of INDITSKY in order to reflect stray light from the light unit back into the light unit to efficiently use all modified and unmodified light to brightly illuminate the LCD.

17. Claims 5 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over IKEDA et al (JP 7-95360) in view of TAI et al (US 5,359,691).

18. Claim 11 recites a light absorbing member located near a border between the light guide plate and the truncated pyramid, wherein the light absorbing member at least partially surrounds a portion of the truncated pyramid, not disclosed by IKEDA.

19. TAI '691 teaches a light absorbing member (coating layer 92 extending sides 54 & 56, col.8, lines 44-60) extending to a border (fig.5) between the wedge-shaped or truncated member (collimating assembly 28") and the light guide plate (14), and the light absorbing member (92) at least partially surrounds a portion (sides 54,56) of the

Art Unit: 2875

truncated pyramid (28") for the purpose of limiting the critical angle of total internal reflection of the truncated member so as direct substantially collimated light towards the light guide plate and absorb light outside the divergence angle. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the truncated pyramid in the light unit of IKEDA et al to include the type of light absorbing member as taught by TAI et al '691 in order to limit the critical angle of total internal reflection of the truncated pyramid so as to reduce the maximum divergent angle propagating nearly collimated light to the light guide plate.

20. In regards to claim 5, IKEDA discloses a refractive index, n_1 or n_2 (col.5, line 50 to col.6, line 1) of the truncated pyramid (4b), the slope surface (43) from which an angle can be derived between the slope (43) and an axis of the truncated pyramid. However, IKEDA does not disclose that angle ranging from 30 to 45 degrees. It would have been obvious to one having ordinary skill in the art to provide the slope angle with the axis of the truncated pyramid to range from 30 to 45 degrees, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. One would have been motivated to form the truncated pyramid of IKEDA with a slope angle ranging 30-45 degrees to include a broad angle near the output angle of the LED light source so as to transmit more light with less internal reflection toward the light guide plate.

Response to Arguments

21. Applicant's arguments, filed March 27, 2006, with respect to the rejection(s) of pending claim(s) 1-3, 5, 8-10, 12, 14; and 11, 13, 14 under PARKER et al (US 5,613,751) and TAI et al (US 5,390,276) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of IKEDA et al (JP 7-95360), ITO et al (US 2001/0017774 A1), INDITSKY (US 7,001,058), and TAI et al (US 5,359,691).

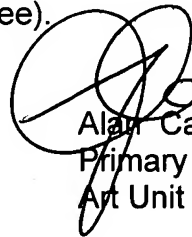
Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. COLGAN et al (US 6,648,485 B1) show a light absorbing material (132, figs.5,7,8) at the border between the light guide plate (110) and input optical structure (112), and further shows truncated pyramid features (sides 164, fig.10) as the input optical structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Cariaso whose telephone number is (571) 272-2366. The examiner can normally be reached on 9-5:30 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sandra O'Shea can be reached on (571) 272-2378. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Alan Cariaso
Primary Examiner
Art Unit 2875

April 30, 2006
AC